REMARKS

The Official Action mailed September 1, 2009, has been received and its contents carefully noted. Filed concurrently herewith is a *Request for One Month Extension of Time*, which extends the shortened statutory period for response to January 1, 2010. Accordingly, the Applicant respectfully submits that this response is being timely filed.

The Applicant notes with appreciation the consideration of the Information Disclosure Statements filed on June 5, 2006; September 18, 2006; September 11, 2008; and January 28, 2009.

Claims 1-3, 5-7 and 9-12 were pending in the present application prior to the above amendment. Claims 1-3, 5-7 and 9-12 have been canceled without prejudice or disclaimer, and new claims 13-24 have been added to recite additional protection to which the Applicant is entitled. Accordingly, claims 13-24 are now pending in the present application, of which claims 13, 20, 23 and 24 are independent. For the reasons set forth in detail below, all claims are believed to be in condition for allowance. Favorable reconsideration is requested.

Paragraph 2 of the Official Action provisionally rejects claim 6 under the doctrine of obviousness-type double patenting over claim 7 of U.S. Application No. 10/582,615 to Majima. As noted above, claim 6 is canceled, without prejudice or disclaimer; the rejection of these claims is therefore moot. Moreover, the Applicant respectfully submits that the new independent claims of the subject application are patentably distinct from the claims of the Majima '615 patent.

As is discussed in greater detail below, the new independent claims better recite the features of the present invention. In light of this amendment, the Applicant respectfully traverses this ground for rejection and reconsideration of the pending claims is respectfully requested. As stated in MPEP § 804, under the heading "Obviousness-Type," in order to form an obviousness-type double patenting rejection, a claim in the present application must define an invention that is merely an obvious variation of an

invention claimed in the prior art patent, and the claimed subject matter must not be patentably distinct from the subject matter claimed in a commonly owned patent. Also, the specification and drawings of the patent principally underlying the double patenting rejection are not considered prior art. It is respectfully submitted that the claims of the present application are not a timewise extension of the invention as claimed in the Majima '615 patent. Reconsideration and withdrawal of the obviousness-type double patenting rejections are requested.

Paragraph 4 of the Official Action rejects claims 1, 6, 9 and 10 as anticipated by U.S. Patent No. 5,214,656 to Chung. The Applicant respectfully submits that an anticipation rejection cannot be maintained against the independent claims of the present application, as amended.

As stated in MPEP § 2131, to establish an anticipation rejection, each and every element as set forth in the claim must be described either expressly or inherently in a single prior art reference. Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

As noted above, claims 1, 6, 9 and 10 have been canceled, without prejudice or disclaimer; the rejection of these claims is therefore moot. Furthermore, the Applicant respectfully submits that, for the reasons provided below, Chung does not teach the features of the new independent claims of present invention, either explicitly or inherently.

Independent claim 13 recites a transmission device comprising a redundant bit addition unit and a modulation unit. The claimed transmission device is distinct in that the redundant bit addition unit operates to add a redundant bit of one bit to each of specific bits to be protected to generate coded data, the specific bits being selected out of supplied data, wherein the redundant bit unit operates to select as a redundant bit to be added a bit being common to both symbol data located at a positive position and symbol data located at a negative position out of the Gray coded 4-level symbols, the positive position and the negative position being away in deviation furthest from each

other, and that the modulation unit operates to generate a modulation wave signal by modulating symbol data with 4-value FSK in accordance to a Gray code sequence, the symbol data being obtained as a unit of 2 bits consisting of each bit and its redundant bit for the specific bits to be protected and a unit of 2 bits for the other data bits, on the basis of the coded data generated by the redundant bit addition unit, to send the generated modulated wave signal.

New independent claim 20 recites a reception device for receiving a signal transmitted from the transmission device as defined in the new independent claim 13 and the present invention's reception device is unique in having the components: a demodulation unit for demodulating the received signal; a symbol decision unit for performing a symbol decision at each Nyquist interval for the demodulated received signal; a bit conversion unit for converting a symbol value obtained by the symbol decision performed by the symbol decision unit into a bit value; and a data recovery unit for composing a data string by deleting the added redundant bit from the data of the bit value converted by the bit conversion unit, to restore original data.

New independent claims 23 and 24 similarly recite methods for transmitting and receiving data. It is respectfully submitted that Chung fails to disclose, either expressly or inherently, the above mentioned features of the present invention. For example, in the new claims, the claimed transmission device's modulation unit is limited to only a modulator operating a 4-value FSK modulation scheme, the significance of which is described as follows.

In general, when receiving a FSK modulated wave signal, the eye-pattern of the demodulated waveform of the received FSK signal is disordered in a communication environment in which a radio wave is weak because noise is mixed with the information signal. Noise occurs, concentrating in a range of a filter for removing adjacent channels and, for example, in the case of 4-value FSK as required in the present invention, if only +3/-3 symbols data is used, the Nyquist point of symbol +3 is observed in a broad range on the positive side. In the FSK scheme, thresholds (th+, th0, th-) exist only in the

inside and +3 belongs everywhere in the outside; therefore, a symbol of +3, for example, is detected more accurately. On the other hand, in a PSK modulation scheme, each of constellation points of received symbols is represented by an angle on an orthogonal axis. The constellation point of a symbol (corresponding to the symbol of +3 in the FSK scheme) moves due to the effect of noise in the reception environment. In such a case, unlike the FSK, a new threshold occurs; the data symbol of +3 with significant noise may result in a symbol of -3. Thus, the Applicant respectfully submits that the PSK scheme is of less merit in such an implementation of the present invention.

The encoding/modulating and demodulating/decoding techniques of the present invention are distinct from those of a general FEC (forward error correction) system, with respect of the following points.

I. Encoding/Modulating (transmission system)

In the transmission system, an encoding process and a modulating process are performed. The modulating process comprises a step of creating symbols by converting two bits data to one symbol, a step of creating impulses of -3, -1, +1 or +3 and a step of forming a continuous waveform by BB filtering, which are common to both the present invention and the general FEC system.

The encoding process of the present invention is different from that of a general FEC system, as described below.

A. Present Invention

- Division Step: A plurality of bits included in a given information bit string are divided into a unit of one bit for specific data bits to be protected and a unit of two bits for the other data bits.
- Addition Step: A redundant one bit (a fixed value of "0" or "1") is added to each of the specific data bits to be protected.
- Interleave Step: This step is not required.

B. General FEC System

- FEC Encode Step: An encoding process is made for a bit string of scores of bits derived from a plurality of bits included in a given information bit string.
- Addition Step: A string of bits obtained by the preceding encode step is added to the original string of bits.
- Interleave Step: The bits included in the strings of bits are interleaved.

II. Demodulating/Decoding (reception system)

In the reception system, a demodulating process and a decoding process are performed. The demodulating process comprises a step of detecting symbols by capturing symbol timing, a step of deciding symbol values based on thresholds and a step of converting the symbol value into bit values, which are common to both the present invention and the general FEC system.

The decoding process of the present invention is different from that of a general FEC scheme, as described below.

A. Present Invention

- Deinterleave Step: This step is not required.
- Deletion Step: The redundant bits added to the specific data bits to be protected on the transmission side are deleted.

B. General FEC System

- Deinterleave Step: The data bits interleaved on the transmission side are returned to the original strings of bits.
- FEC Decode Step: Errors are corrected based on the plurality of strings of bits.

As noted above, the present invention obtains a distinct advantage in that the number of symbols to be modulated is changed (i.e., a modulation scheme is changed),

but the conversion of symbol numbers from 4 to 2 is made by executing only a bit manipulation. The present invention is technically advantageous due to the simplicity of implementing only the addition and deletion of bits, compared to the conventional technique of changing a modulation scheme.

The present invention's technique uses a bit manipulation similar to the general FEC system, but the present invention is preferable in that only bits to be protected can be singly processed. In a general FEC system, there is block encoding and convolution encoding, any of which uses a plurality of strings of bits (normally, scores to several hundreds of bits) to execute encoding/decoding. In other words, in the general FEC system, it is essential to use a plurality of bits; therefore, if less information data is to be transmitted, then the transmission is not efficient because FEC is carried out for unimportant data. By contrast, since the present invention performs processing for a unit of one bit, it is not necessary to form a data cluster consisting of a plurality of bits. Accordingly, an advantage of the present invention is its convenience when implemented to protect a single bit flag representing ON/OFF.

Therefore, the Applicant respectfully submits that Chung does not teach the above mentioned features of the new independent claims, either explicitly or inherently.

Since Chung does not teach all the elements of the independent claims, either explicitly or inherently, an anticipation rejection cannot be maintained. Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. § 102 are in order and respectfully requested.

Paragraph 6 of the Official Action rejects dependent claim 2 as obvious based on the combination of Chung and U.S. Patent No. 5,457,705 to Todoroki. Paragraph 7 of the Official Action rejects dependent claim 3 as obvious based on the combination of Chung and U.S. Patent No. 4,901,072 to Fox. Paragraph 8 of the Official Action rejects dependent claim 5 as obvious based on the combination of Chung and U.S. Patent No. 5,818,875 to Suzuki. Paragraph 9 of the Official Action rejects dependent claim 7 as obvious based on the combination of Chung, Suzuki and U.S. Patent No. 5,566,213 to

Carsello. Paragraph 10 of the Official Action rejects dependent claim 11 as obvious based on the combination of Chung, Todoroki and Suzuki. Paragraph 11 of the Official Action rejects dependent claim 12 as obvious based on the combination of Chung, Fox and Suzuki. The Applicant respectfully submits that a *prima facie* case of obviousness cannot be maintained against the independent claims of the present application, as amended.

As stated in MPEP §§ 2142-2144.04, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some reason, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some reason to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." In re Kotzab, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

Please incorporate the arguments above with respect to the deficiencies in Chung. Claims 2, 3, 5, 7, 11 and 12 have been canceled without prejudice or disclaimer; the rejection of these claims is therefore moot. Moreover, Chung, either alone or in combination with Todoroki, Fox, Suzuki or Carsello, does not teach or suggest the above-mentioned features of the present invention. Since Chung, Todoroki, Fox, Suzuki and Carsello do not teach or suggest all the claim limitations, a *prima facie* case of obviousness cannot be maintained. Accordingly, reconsideration

and withdrawal of the rejections under 35 U.S.C. § 103(a) are in order and respectfully requested.

Should the Examiner believe that anything further would be desirable to place this application in better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number listed below.

The Commissioner is hereby authorized to charge fees under 37 C.F.R. §§ 1.16, 1.17, 1.20(a), 1.20(b), 1.20(c), and 1.20(d) (except the Issue Fee) which may be required now or hereafter, or credit any overpayment to Deposit Account No. 50-2280.

Respectfully submitted,

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